The Connecticut Agricultural Experiment Station.

NEW HAVEN, CONN.

BULLETIN, No. 87.

MARCH, 1886.

Notice.

The Bulletins of this Station will be sent without further special request to those periodicals and public institutions which have received them hitherto. They will also be mailed to citizens of Connecticut who send their names and addresses to the Station for that purpose. Such applications should be annually renewed as new mailing lists are prepared at the beginning of each year.

Citizens of other States may receive them together with the Annual Report by remitting fifty cents to cover cost of mailing, etc. Such orders should be sent in early in the year.

As required by law, a package of each Bulletin is mailed to every post-office in the State. The package is directed to the Postmaster, with a request to distribute to farmers. The number sent will be increased in any case on application.

VALUATION OF FERTILIZERS.

Explanations.

The average Trade-values or cost, per pound, of the ordinarily occurring forms of nitrogen, phosphoric acid and potash, as found in the large markets of New England, New York and New Jersey, are as follows :—

These Trade-values, except those for phosphoric acid soluble in ammonium citrate, were agreed upon by the Experiment Stations of Connecticut, New Jersey and Massachusetts for use in their several States during 1886.

Trade Values of Fertilizing Ingredients in Raw Materials and Chemicals for 1886.

	Cents per lb
Nitrogen in ammonia salts	18.5
" in nitrates	18.5
Organic nitrogen in dried and fine ground fish	17
" " in guanos, dried and fine ground blood and meat	17
" " in cotton seed, linseed meal and in castor pomace	17
" " in fine ground bone	17
" " in fine medium bone	15
" " in medium bone	13
" " in coarse medium bone	11
" " in coarse bone, horn shavings, hair and fish scrap	9
Phosphoric acid, soluble in water	8
" " soluble in ammonium citrate*	7½
" " insoluble in dry ground fish	7
" " in fine bone	7
" " in fine medium bone	6
" " in medium bone	5
" " in coarse medium bone	4
" " in coarse bone	3
" " in fine ground rock phosphate	2
Potash as high grade sulphate	5½
" kainit	4½
" muriate	4½

The above Trade-values are the figures at which in March the respective ingredients could be bought at retail for cash, in our large markets, in the *raw materials* which are the regular source of supply. They also correspond to the average wholesale prices for the six months ending March 1st, plus about 20 per cent. in case of goods for which we have wholesale quotations. The valuations obtained by use of the above figures will be found to agree fairly with the *reasonable retail price* at the large markets of standard raw materials such as:—

Sulphate of Ammonia,	Azotin,
Nitrate of Soda,	Dry Ground Fish,
Muriate of Potash,	Cotton Seed,
Sulphate of Potash,	Castor Pomace,
Dried Blood,	Bone,
Plain Superphosphate.	Ground So. Car. Rock.

*Dissolved from 2 grams of the unground phosphate previously extracted with pure water, by 100 c. c. neutral solution of Ammonium Citrate, sp. gr. 1.09, in 30 minutes, at 65° C., with agitation once in five minutes. Commonly called "reverted" or "backgone" Phosphoric Acid.

Trade Values in Superphosphates, Special Manures and Mixed Fertilizers of High Grades.

The Organic Nitrogen in these classes of goods is reckoned at the highest figure laid down in the Trade-values of Fertilizing Ingredients in Raw Materials, namely, 17 cents per pound, it being assumed that the organic nitrogen is derived from the best sources, viz: bone, blood, animal matter, or other equally good forms and not from leather, shoddy, hair or any low-priced inferior forms of vegetable matter, unless the contrary is ascertained.

Insoluble Phosphoric acid is reckoned at 3 cents, it being assumed, unless found otherwise, that it is from bone or similar source and not from rock phosphate. In this latter form the insoluble phosphoric acid is worth but 2 cents per pound. Potash is rated at 4¼ cents, if sufficient chlorine is present in the fertilizer to combine with it to make muriate. If there is more Potash present than will combine with the chlorine, then this excess of Potash is reckoned as sulphate.

In most cases the valuation of the Ingredients in Superphosphates and Specials falls below the retail price of these goods. The difference between the two figures, represents the manufacturer's charges for converting raw materials into manufactured articles. These charges are for grinding and mixing, bagging or barreling, storage and transportation, commission to agents and dealers, long credits, interest on investment, bad debts, and finally, profits.

In 1885 the average selling price of Ammoniated Superphosphates and Guanos was $37.60, the average valuation was $30.47, and the difference $7.13—an advance of 23.4 per cent. on the valuation and on the wholesale cost of the fertilizing elements in the raw materials.

In case of Specials the average cost was $44.80, the average valuation $38.70, and the difference $6.10 or less than 16.0 per cent. advance on the valuation.

To obtain the Valuation of a Fertilizer (i. e. the money-worth of its fertilizing ingredients), we multiply the pounds per ton of Nitrogen, etc., by the trade-value per pound. We thus get the values per ton of the several ingredients, and adding them together we obtain the total valuation per ton.

Further explanations may be found in the Annual Report.

FERTILIZER ANALYSES.

Cotton Hull Ashes.

The three following samples were sent by Ariel Mitchelson, Tariffville.

1594 has a light color. **1593** is of medium shade, and **1595** is dark in color.

Analyses.

	1594	1593	1595
Phosphoric acid soluble in water	.17	.56	2.57
" " soluble in ammonium citrate*	5.60	4.88	4.31
" " only soluble in acid	.16	.29	1.50
Potash soluble in water	28.54	26.34	20.59
Valuation per ton	$40.12	$37.31	$33.83

The valuations are based on the schedule of Trade-values for 1886, viz: Soluble phosphoric acid, 8 cents per pound, reverted phosphoric acid, 7½ cents, insoluble phosphoric acid, 2 cents, potash, 5½ cents.

15 Analyses of Cotton Hull Ashes have been made at this Station during the last two years. The average composition as well as the maximum and minimum per centages of the most valuable ingredients are given below.

	Average.	Maximum.	Minimum.
Phosphoric acid soluble in water	1.29	2.57	.17
" " soluble in ammonium citrate*	5.55	8.06	4.18
" " only soluble in acid	1.27	3.34	.16
Potash soluble in water	24.52	32.52	13.14

These figures show that the material is quite variable in composition. The ashes which are lightest in color are usually richest in potash.

Star Fish.

Star fish which are the most destructive pest of the oyster beds on our coast are brought ashore in considerable quantity by boats which are engaged in removing them by dredges from the beds. They have been composted and used as manure to some extent. The following analysis was made on Star fish kindly supplied by J. and G. H. Smith, 150 Long Wharf.

The Stars were taken immediately after being landed. For comparison, the analysis of horse manure of average quality is also given.

* "Reverted."

	Star Fish.	Horse Manure.
Water	68.78	71.30
Organic matter	15.13	25.40
Containing nitrogen	[1.72]	[.58]
Ash	16.09	3.30
	100.00	100.00
The ash contains—		
Potash	.48	.54
Soda	.31	.10
Lime	7.22	.21
Magnesia	.63	.14
Oxide of iron	.12	.11
Phosphoric acid	.25	.28
Sulphuric "	.32	.07
Carbonic "	5.81	--
Chlorine	.47	.04
Sand and silica	.59	1.21
	16.20	3.25
Deduct oxygen equiv. chlorine	.11	
	16.09	

The analyses indicate that the fresh Star fish contain about as much phosphoric acid and potash and three times as much nitrogen as average horse manure. The percentage of water is not very different. Horse manure contains 10 per cent. more of organic matter which on some lands has considerable value as an amendment, while the Star fish supply about 12 per cent. of useful carbonate of lime. The organic matter of the Star fish rapidly decays and liquifies and its nitrogen quickly becomes available as plant food. The organic matter of horse manure is largely vegetable fiber that has resisted digestion and requires considerable time to decay away. The nitrogen of horse manure is accordingly much less effective than that of the Star fish.

Analysis of Florida Oranges.

A considerable number of Connecticut citizens are interested in orange growing in Florida, and from time to time inquiries have been made as to the requirements of that crop which could not be satisfactorily answered from the data at hand.

The subjoined analysis of a fine sample of orange fruit gathered in its best condition about the first of January and furnished by Mr. T. W. T. Curtis of New Haven from his grove in Florida,

has been made in order to ascertain what is carried off the land in the orange crop. The analysis includes the whole fruit as it comes into market.

Water (with some volatile oil) expelled at 212°	85.29
Organic* and volatile matter (lost at low red heat)	14.27
Ash (reckoned free from carbon and carbonic acid)	.44
	100.00

The ash contains—

Potash	56.44
Soda	1.81
Lime	18.70
Magnesia	4.72
Oxide of iron	.50
Phosphoric acid	13.28
Sulphuric "	4.15
Silica	.40
	100.00

The oranges in a single box exclusive of the case and packing weighed 64.5 pounds. The yield per acre was 100 boxes or 6450 pounds of fruit. The export per acre in this crop is accordingly as follows :

Nitrogen	9.2 pounds.
Potash	16.0 "
Soda	0.5 "
Lime	5.3 "
Magnesia	1.4 "
Oxide of iron	0 1 "
Phosphoric acid	3.8 "
Sulphuric acid	1.2 "
Silica	0.1 "

Fodder Analyses.

Buckwheat Mill Products.

The three following samples were sent by the Quinnebaug store, Danielsonville. They represent the products of a new milling process there in operation.

CCXII. Buckwheat Hulls.

CCXIII. Buckwheat Bran or Middlings.

CCXV. Buckwheat Flour.

* Containing nitrogen .14.

The Hulls are of very little feeding value, considerably less than wheat or rye straw. The digestibility of their albuminoids is probably less than that of straw. As regards its chemical composition the flour is of superior quality. The bran or middlings is remarkable, being a much more concentrated food than wheat bran and more nearly resembling gluten meal or linseed meal in its content of albuminoids or protein and fat. It should be used at first with great caution, but may prove to be an excellent feed if produced in sufficient quantity. The analyses are given in tabular form further on.

Oat Feed.

CCXVII. Oat feed. Sampled and sent by Benj. F. Case, Canton Center.

Mr. Case says: "It is said to be the product of an oatmeal mill where they can use none but strictly No. 1 oats that are perfectly sweet, which are thoroughly cleaned and dried before crushing." [See analysis further on.]

The analysis shows that this material has about $1\frac{1}{3}$ per cent. more of albuminoids, a per cent. more of fat, $3\frac{1}{2}$ per cent. more fiber and $4\frac{3}{4}$ per cent. less nitrogen-free extract than average oats. If wholly made from clean oats the digestibility should not be less than that of oats.

The Buckhorn Fern. [*Osmunda regalis*, L.]

CCXVI. This sample (2 pounds) was sent by L. J. Platts, Esq., Deep River, who says in regard to it, "It is known here as the buckhorn or broad leaf brake. Of all products of swamp land cattle will eat this with the greatest relish when cured as hay, picking out every leaf before eating much of the bog hay. It is probably the only fern they eat much of. Sheep will eat most varieties to some extent. It grows to a considerable extent in most swamps mixed with bog and other grasses." This sample was cut about the middle of August, and consisted entirely of sterile fronds.

As far as the chemical analysis indicates it is equal to good meadow hay, but it should be remembered that chemical analysis alone cannot determine the feeding value.

	Buckwheat Hulls. CCXII.	Buckwheat Middlings. CCXIII.	Buckwheat Flour. CCXV.	Oat Feed. CCXVII.	Fern. (Osmunda.) CCXVI.
Water	14.07	16.33	17.63	8.19	14.56
Ash	2.27	5.50	.83	4.24	6.09
Albuminoids or Protein	4.87	30.31	8.13	12.64	10.24
Fiber	38.49	4.02	.52	12.48	21.60
Nitrogen-free extract	39.20	36.29	71.10	56.31	45.10
Fat	1.10	7.55	1.79	6.14	2.41
	100.00	100.00	100.00	100.00	100.00
Percentage digestibility of the albuminoids	10.2	95.8	93.9		
		Water Free.			
Ash	2.64	6.57	1.00	4.61	7.11
Albuminoids or Protein	5.66	36.20	9.87	13.76	11.99
Fiber	44.79	4.79	.63	13.59	25.29
Nitrogen-free extract	45.62	43.43	86.34	61.36	52.79
Fat	1.29	9.01	2.16	6.68	2.89
	100.00	100.00	100.00	100.00	100.00